Quantum Electronics. John R. Pierce. Doubleday & Co., Inc., Garden City, N.Y. 1966. 138 pp. $1.25 (paper).

Reviewed by Thomas D. Rossing
Saint Olaf College, Northfield, Minn.

To anyone familiar with the excellence of Dr. Pierce's popular books on electronics and related areas, a

book review is hardly necessary; he probably ordered this book as soon as it was announced. If any reader hasn't, he should do so.

The book is a sequel to the author's *Electrons and Waves*, also published in the Science Study Series (1964). According to the Preface, a third volume is yet to come.

The book begins with a brief and perhaps rather sketchy introduction to quantum mechanics. If the reader has not had some previous exposure to the subject, he may find statements—such as "The momentum wave function is the Fourier transform of the position wave function"—a little cryptic. However, if he has read some other books in the Science Study Series or completed a high school physics course, he will find that this brief introduction to the subject sets the stage for what follows.

A chapter entitled "Noise" follows, and here Dr. Pierce demonstrates his remarkable skill at making rather difficult ideas sound easy. He discusses Johnson noise and shot noise and calculates the minimum noise power possible in an amplifier.

The chapter on "Masers" is probably the best of all, for relatively little nontechnical material is available in this area, certainly nothing as authoritative and well-written as this chapter. With all the publicity and glamor which its optical cousin has received, few students realize that the pioneer member of the "-aser" family of stimulated emitters operated at microwave frequencies.

That is not to say that the "Lasers" chapter is not worthwhile, but the subject just has more competition in the literature. This treatment is, in fact, one of the best, and will undoubtedly be the impressive section in the book for many young readers. The "typical" gas laser he describes is rf-powered with Brewster windows and external mirrors, whereas the odds are overwhelming that the first laser a student encounters these days will be dc-powered and have internal mirrors, now that this latter type can be purchased for less than $200. If so, he may be surprised to find that the light from his laser is coherent yet unpolarized, since Dr. Pierce contrasts coherent, polarized light from a laser with "ordinary" incoherent, unpolarized light. This is the only flaw I could find in his brief but excellent treatment of the subject.

The final chapter is a seemingly unrelated but nonetheless worthwhile one on "Semiconductors." Dr. Pierce covers the subject reasonably well in 28 pages, even describing a few interesting applications.

The real feature of the book as a whole is its readibility. It is difficult to imagine that anyone would find this excellent little book dull reading. It has become a tradition for book reviewers to search diligently for missing constants, incorrect exponents, etc. I found none. I merely read the book and enjoyed it. I hope that others will do the same.